

OUTLINE FOR ENGINEERING EVALUATION/COST ANALYSIS (EE/CA)
SCOPE-OF-WORK UNDER CERCLA/SARA

1. Site Description, Project Planning Overview, and
Objectives

Refer to the RI/FS outline for additional information on the
topics to be covered here. Section 1. presents information
developed by the project team for the Contractor's informa-
tion.

- 1.1 Site Description
 - 1.1.1 Location
 - 1.1.2 Site Background
 - 1.1.3 Previous Studies and Results
 - 1.1.4 Regulatory Authorities

Include appropriate references to regulatory program/
authority under which the site is being addressed (i.e.
CERCLA/SARA, Executive Order 12088, the National Contingency
Plan, NEPA, any IAGs).

Furthermore, the manager should contact the state at non-NPL
sites in order to determine if there are any state
requirements for removal actions. The appropriate
information gathered should be summarized here. The
appropriate manager should add any statutory requirements
imposed by the state. If there are no state requirements, the
manager should contact the EPA region for other guidance.
State requirements or other EPA guidance should be discussed
here.

1.2 Project Planning Overview and Objectives

Refer to the RI/FS scope outline for additional information
on general approaches to developing project objectives for
project planning. The described approach would be most
appropriate if additional sampling may be necessary.

This section should summarize the applicability of general EE/CA objectives to the project as the USACE team understands it. An EE/CA is a comparative analysis of removal action options for a CERCLA site. EE/CAs are required only for non-time-critical removal actions (RA)/expedited response actions (ERAs). Non-time-critical removal actions are those which address releases or threats of releases where the lead agency determines that more than 6 months are available for planning prior to undertaking a removal.

EE/CAs are not required for time-critical removal actions, however, they may be done. This determination is made at the discretion of the lead federal agency. Future follow-on work at these sites should be anticipated, such as an RI/FS and Record of Decision, as necessary.

- 1.2.1 Site Strategy Development
- 1.2.2 Project Objectives and Project Decision Statements
- 1.2.3 Data Quality Objectives
- 1.3 Summary of Tasks

The elements of an EE/CA are similar to the elements required in an RI/FS, and could be construed as a focused or limited RI/FS, in view of statutory requirements, cost, and time constraints of a removal action. The following is only a superficial listing of tasks to be performed under this scope-of-work. No details are specified in this section.

- Task 1 - Project Planning
- Task 2 - Community Relations
- Task 3 - Field Investigations
- Task 4 - Sample Analyses, Data Assessment and Reporting
- Task 5 - Data Evaluation
- Task 6 - Development/Refinement of Removal Action Objectives
- Task 7 - Development and Initial Screening of Removal Action Alternatives
- Task 8 - Treatability Studies
- Task 9 - Detailed Analysis of Removal Alternatives
- Task 10 - Comparison of Alternatives and Proposal of Removal Action
- Task 11 - EE/CA Report
- Task 12 - Action Memorandum Preparation

Task 13 - Post EE/CA Support
1.4 References

Include citations of previous reports, guidance documents, etc. Note which ones are to be provided to the Contractor. Previous reports or other historical documents should only be referenced if the team possesses or can locate them.

2. Project Requirements

2.1 Task 1 Project Planning

2.1.1 Available Data Review

This section requires the Contractor to compile available data as it relates to the preparation of the EE/CA and requires the Contractor to visit the site. Based on these activities, the Contractor should be required to assess any data gaps which would affect preparation of the EE/CA. This can be prepared by any team member, but probably best done by the project manager.

2.1.1.1 Review Previous Reports/Data

2.1.1.2 Site Walkover

2.1.1.3 Data Gap Identification

2.1.2 EE/CA Workplan Development

Refer to the RI/FS SOW outline for general requirements/explanatory text related to these topics. Note that removal action objectives are similar to RI/FS objectives, but are prepared in light of the guidance on removal actions under CERCLA.

2.1.2.1 Site Background Summary

2.1.2.2 Identification/Refinement of DQOs

2.1.2.3 Refinement Preliminary Removal
Action Objectives

2.1.2.4 Data Collection Design

2.1.3 Preparation of Workplan Attachments

Refer to the RI/FS SOW outline for explanatory text for these topics. These plans would generally only be applicable if

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additional sampling is required to support the preparation of the EE/CA.

- 2.1.3.1 Site Safety and Health Plan (SSHP) Attachment
- 2.1.3.2 Chemical Data Acquisition Plan (CDAP) Attachment
- 2.1.3.3 Monitoring Well Installation and Drilling Plan (MWIP) Attachment
- 2.1.3.4 Treatability Study Workplan Attachment

2.2 Task 2 Community Relations

This section presents requirement for Contractor's involvement in community relations. Refer to the RI/FS outline for additional information. Note that for non-time-critical removal actions, the lead federal agency must, 1) prior to completing the EE/CA, conduct interviews to gain information on how the public would like to be involved in the process and prepare a formal community relations plan; 2) publish notice of availability and brief description of the EE/CA in a local newspaper of general distribution; 3) provide at least a 30-day comment period on the EE/CA; and 4) prepare written responses to comments on the EE/CA. The information repository and administrative record file must be established no later than the signing of the Approval Memorandum. If the site involves an active federal facility, input and comment on this section by the installation is recommended.

Refer to the RI/FS SOW outline for general requirements and explanatory text related to these topics. The appropriate manager shall ensure that the above requirements, plus any state requirements, be added to this scope.

- 2.2.1 Community Relations Plan
- 2.2.2 Preparation of Community Relations Support
- 2.2.3 Public Meetings
- 2.2.4 Responsiveness Summary

2.3 Task 3 Field Investigations

This section would require the Contractor to perform field activities in support of the EE/CA, if appropriate. Only

activities necessary to clarify data gaps and better define the scope and nature of the removal action need to be considered here. NOTE: Not all of the activities listed below are required for a given project; this list of possible activities is provided only for completeness. Because the time frame for removal actions is relatively short, field investigations should be very limited in scope.

For additional information, consult the explanatory text under the same topics in the outline for the RI/FS.

- 2.3.1 Site Topographic and Boundary Surveys
- 2.3.2 Geophysical Surveys
- 2.3.3 Soil Gas Sampling
- 2.3.4 Drum Sampling
- 2.3.5 Surface Soil Sampling
- 2.3.6 Surface Water/Lagoon Sampling
- 2.3.7 Leachate Sampling
- 2.3.8 Subsurface Soil Sampling
- 2.3.9 Monitoring Well Installation and Sampling
- 2.3.10 Air Sampling
- 2.3.11 Wipe Samples
- 2.3.12 Vadose Zone Permeability/Infiltration Testing
- 2.3.13 Aquifer Tests
- 2.4 Task 4 Sample Analyses, Data Assessment and Reporting

This section should define analytical procedures and data assessment/validation protocols for completion of the EE/CA. Based on field investigations specified in Task 3, the following sections of this task will be developed by the chemist. Analytical procedures will only be specified for appropriate matrices to be collected in the field investigations.

For additional information, consult the explanatory text in the RI/FS SOW outline.

- 2.4.1 Data Review and Assessment
 - 2.4.1.1 Existing Data
 - 2.4.1.2 New Data
- 2.4.2 Analytical Procedures
 - 2.4.2.1 Field Screening

- 2.4.2.2 Water
 - 2.4.2.2.1 Surface
 - 2.4.2.2.2 Ground Water
- 2.4.2.3 Soils/Sediments/sludges
- 2.4.2.4 Drum Samples
- 2.4.2.5 Air Samples
- 2.4.2.6 Bench Scale Testing
- 2.4.3 Quality Assurance/Quality Control Samples

The requirement for acquisition of field QA/QC samples may be applicable only at the beginning of the treatability study to ensure an accurate characterization of the waste stream.

- 2.4.4 Laboratory Internal Quality Control
- 2.4.5 Method Detection Limits
- 2.4.6 Laboratory Turnaround Time
- 2.4.7 Sample Handling
- 2.4.8 Preservatives and Holding Times
- 2.4.9 Investigation-Derived Wastes

Treatability studies require much greater volumes than ordinary investigations. Therefore, the remaining laboratory sample may be substantial and require additional cost for disposal by the laboratory, or returning to the site for disposal via the chosen remedial alternative. It is important to collaborate with the project regulatory specialist on correct manifesting and shipping requirements.

2.5 Task 5 Data Evaluation

This task would generally only be applicable if additional field sampling was required to support the EE/CA.

2.5.1 Comparison to Data Quality Objectives - Establish Data Usability

Refer to the RI/FS outline for more information on the content for this section. Note that this task would only apply if additional field data is gathered to support the EE/CA. Results of this task would be documented in the EE/CA report and would not require a separate submittal. For the

EE/CA, this section would require that usability parameters, including such items as the PARCC parameters and geotechnical/hydrogeological needs be evaluated for support to the intended use of the data; evaluation of the removal action alternatives.

2.5.2 Refinement of Site Conceptual Model

Refer to the RI/FS outline for more information on this section.

2.5.2.1 Nature and Extent of Contamination

This section should describe the requirements for refining the conceptual model of the nature and extent of contamination at the sites. Refer to the RI/FS outline for more information. Careful cross referencing to the EE/CA Report Section (2.11) would be helpful in avoiding a duplication of instruction on preparing items related to this activity and double payment for the work.

2.5.2.2 Hydrogeology

Refer to the RI/FS for general information on the content of this section. Many of the presentations of the data would be used in the EE/CA report. The analysis performed under this section would only be conducted to the extent possible with information gathered to meet the objectives of the EE/CA.

2.6 Task 6 Development/Refinement of Removal Action Objectives

See Enclsoure 11 to the ETL, Alternative Selection for additional information.

This section requires the Contractor to consider various criteria in developing or refining removal action objectives. Input for this section should be developed by the project team, including process engineer, project manager, and team

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member responsible for the review of risk issues and/or regulatory matters.

2.6.1 Statutory Limits

The scope should require that the Contractor consider statutory requirements associated with removals and discuss these in the EE/CA report. Although the statutory limits strictly apply to EPA since they use trust funds, it does not strictly apply to DOD. However, work on DOD projects should also consider these limits.

2.6.2 Risk Based Mitigation Requirements

As part of the EE/CA, an evaluation of removal/remediation requirements should include a cursory examination of risks, and requirements for reducing or mitigating those risks, that will either contribute to the final action at the site, or act to eliminate the hazard. It is assumed that a PA/SI has been performed at the site prior to consideration of any removal action activities, and that the "Risk Screening Analysis", has been written as part of the PA/SI (See PA/SI SOW Guidance). This preliminary screening analysis provides the basis for comparative analysis in the EE/CA of alternatives relative to risk mitigation or reduction. A brief qualitative analysis or summary of how each alternative reduces baseline risks, is used in selecting the removal action alternative, and requirements for this analysis should be included in this section.

2.6.3 ARARs Development

The scope should require that the Contractor write a letter to all regulatory agencies requesting ARARs. Then the Contractor should also specifically analyze and determine ARARs independently.

2.6.4 Development or Refinement of Removal Action Scope

This section should actually require the Contractor to define the specific actions required by the removal (not the means, but the "end" for the action, such as removal of the drums or floating product).

2.6.5 Removal Action Schedule

The scope should require that the Contractor develop a removal action schedule and include this schedule in the EE/CA report.

2.7 Task 7 Development and Initial Screening of Removal Action Alternatives

Require the Contractor to develop alternatives in accordance with the requirements of Enclosure 11 to the ETL, Alternative Evaluation and Selection.

The definition of "removal action" precludes development of some alternatives that might otherwise be suitable. This section should be developed with input from the process engineer.

2.8 Task 8 Treatability Studies

With some exceptions, such as required pre-treatment for off-site disposal and ground water/product recovery, treatability studies are generally not appropriate for removal actions. If an off-site disposal facility requires treatability studies for acceptance, consider total acceptance of their prescribed protocol, with QA/QC requirements. Refer to Enclosure 12 to the ETL, Treatability Studies and Treatability Study Reports, for information on treatability studies.

Additional field sampling related to treatability studies should be included under Task 3 Field Investigations. Cross reference that section.

2.8.1 Treatability Study Workplan

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- 2.8.2 Treatability Study Procedures
- 2.8.3 Treatability Study Report
 - 2.8.3.1 Draft Treatability Study Report
 - 2.8.3.2 Final Treatability Study Report

2.9 Task 9 Detailed Analysis of Removal Alternatives

See Enclosure 11 to the ETL, Alternative Evaluation and Selection for the details of selection of the most appropriate alternative.

Require the Contractor to evaluate the alternatives against the criteria described in Enclosure 11. Refer to EPA EE/CA guidance for further information. The analysis need not be extensive if time constraints preclude detailed analysis.

- 2.9.1 Technical Feasibility
- 2.9.2 Implementability of Alternatives
- 2.9.3 Institutional Considerations and other Compliance Issues
- 2.9.4 Effectiveness of Alternatives
- 2.9.5 Environmental Impacts
- 2.9.6 Reasonable Cost of Alternatives

This section should require cost estimates for the removal action alternatives which are detailed to a level commensurate with the level of design, with appropriate design contingencies applied to relevant cost items. Refer to the construction costs section of the RI/FS outline for additional information on the paragraphs under this topic. This section should be prepared with input from the appropriate cost engineering staff.

- 2.9.6.1 Construction Costs
- 2.9.6.2 Other Markup Costs

2.10 Task 10 Comparison of Alternatives and Proposal of Removal Action

See Enclosure 11 to the ETL, Alternative Evaluation and Selection, for the details of selection of the most appropriate alternative.

The Contractor should be required to identify the proposed removal action. If proposed action will exceed \$2 million, include justification of need to exceed the statutory limits in the Administrative Record.

2.11 Task 11 EE/CA Report
2.11.1 Draft EE/CA Report

This section requires the Contractor to prepare a draft EE/CA report. For format, refer the Contractor to the EE/CA guidance. In general, the format is as follows:

- Table of Contents
- Site Characterization
- Identification of Removal Action Objectives
- Identification of Removal Action Alternatives
 - Initial Screening of Alternatives
 - Analysis of Remaining Alternatives
 - Comparative Analysis of Alternatives
- Recommended Removal Alternative

2.11.2 Final EE/CA

2.12 Task 12 Action Memorandum Preparation

This section requires the Contractor to prepare an action memorandum. This document would describe the proposed removal action and secure management approval to conduct the action. The responsiveness summary is a summary of significant public comments and the response to these comments.

The NCP states that the Action Memorandum should include the following:

- Action Memorandum
 - Site background
 - Threat to the public health, welfare and/or the environment
 - Proposed actions and costs
 - Expected change in situation should no action be taken or should action be delayed
 - Important policy issues
 - Recommendations
- Responsiveness Summary

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2.13 Task 13 Post EE/CA Support

This section can require a variety of support from the Contractor. This could include design-like activities. These would be generally limited to site drawings delineating the affected materials and specifications for a contract.

3. Project Management

Refer to the Project Management Section (3.) in the RI/FS scope outline for explanatory text for this section.

- 3.1 Project Manager
- 3.2 Community Relations Support
- 3.3 Coordination with Other Entities
- 3.4 Conference Notes
- 3.5 Confirmation Notices
- 3.6 Government Support
 - 3.6.1 Government Provided Data and Information
 - 3.6.1.1 Existing Plans
 - 3.6.1.2 Surveys
 - 3.6.1.3 Air Photos
 - 3.6.2 Utilities
 - 3.6.3 Permits
 - 3.6.4 Rights of Entry
 - 3.6.5 Security
 - 3.6.6 Equipment Storage/Staging Areas
 - 3.6.7 Grading and Site Restoration
 - 3.6.8 Cuttings/Waste Disposal
- 3.7 Travel and Meetings
 - 3.7.1 Site Walkover
 - 3.7.2 Public Meetings
 - 3.7.3 Draft Treatability Study Review Conference (Option)
 - 3.7.4 Draft EE/CA Review Conference
 - 3.7.5 Other Site Visits
 - 3.7.6 Additional Trips
- 3.8 Schedules
- 3.9 Submittals

This section summarizes the submittals expected during the course of the project. No technical requirements are

presented here. Number of copies required are specified here.

- 3.9.1 General Submittal Requirements
- 3.9.2 Document Submittal Register
- 3.9.3 EE/CA Workplan
 - 3.9.3.1 EE/CA Workplan
 - 3.9.3.2 Workplan Attachments

These plans are described in detail in technical sections and other appendices. These plans may not be necessary if field work or a treatability study is not required.

- 3.9.3.2.1 Chemical Data Acquisition Plan (CDAP) Attachment
 - 3.9.3.2.2 Site Safety and Health Plan (SSHP) Attachment
 - 3.9.3.2.3 Monitoring Well Installation and Drilling Plan (MWIP) Attachment
 - 3.9.3.2.4 Community Relations Plan (CRP) Attachment
 - 3.9.3.2.5 Treatability Study Workplan Attachment
- 3.9.4 Progress Reports
 - 3.9.4.1 Monthly Progress Reports
 - 3.9.4.2 Daily Quality Control Reports
- 3.9.5 Survey Documents
- 3.9.6 Drill Logs/Monitoring Well Construction Diagrams
- 3.9.7 Treatability Study Report

Include if appropriate. See A Enclosure 12 to the ECL, Treatability Studies and Treatability Study Reports for the details.

- 3.9.7.1 Draft Treatability Study Report
 - 3.9.7.2 Final Treatability Study Report
- 3.9.8 EE/CA Report
 - 3.9.8.1 Draft EE/CA Report
 - 3.9.8.2 Final EE/CA Report
- 3.9.9 Cost Estimates
- 3.9.10 Quality Control Summary Report

3.9.11 Action Memorandum

4. Health and Safety Technical Requirements

This section presents the technical requirements for health and safety. Refer to Enclosure 8 to the ECL for the suggested language for this SOW section.

Two Topics, "Site Description and Contamination Characterization" and "Staff Organization, Qualifications, and Responsibilities" may be addressed as a portion of the workplan as outlined in section 2.1. In the event this material is addressed within the workplan (WP), the applicable WP sections should be referenced within these sections of the SSHP. Regardless of location, these topics should address the requirements contained in Enclosure 8.

5. Chemistry Technical Requirements

This section presents the technical requirements for performance of sampling and analysis activities. Specific requirements are discussed under the individual topics. Additional guidance on the typical content of this section is provided as Enclosure 13 to the ECL, Chemistry Technical Requirements. An outline of the section is provided here.

5.1 Introduction

5.1.1 CDAP Format and Implementation Requirements

- 5.1.1.1 Section 1. Table of Contents
- 5.1.1.2 Section 2. Project Background Data
- 5.1.1.3 Section 3. Chemical Requirements to Support Project Data Quality Objectives (DOS)
- 5.1.1.4 Section 4. Contractor Project Organization and Functional Areas of Chemistry Responsibilities
- 5.1.1.5 Section 5. Field Activities

Note that treatability studies require much greater sample volumes than ordinary investigations. Therefore, collaboration with the primary laboratory is required to define required volumes, and containment necessary.

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5.1.1.5.1 Field Instrumentation and
Equipment (Calibration and
Maintenance)

5.1.1.5.2 Field Documentation

5.1.1.5.3 QC and QA Field Samples

The requirement for acquisition of field QA/QC samples may be
applicable only at the beginning of the treatability study to
ensure an accurate characterization of the wastestream.

5.1.1.5.4 Decontamination Procedures

5.1.1.5.5 Matrix: Groundwater Samples

5.1.1.5.5.1 Field Screening

5.1.1.5.5.2 Locations

5.1.1.5.5.3 Sampling Procedure

5.1.1.5.5.4 Analytical Procedure

5.1.1.5.5.5 Sample Containers,
Preservations, Holding
Times

5.1.1.5.6 Matrix: Surface Water Samples

5.1.1.5.6.1 Field Screening

5.1.1.5.6.2 Locations

5.1.1.5.6.3 Sampling Procedure

5.1.1.5.6.4 Analytical Procedure

5.1.1.5.6.5 Sample Containers,
Preservations, Molding
Times

5.1.1.5.7 Matrix: Leachate Samples

5.1.1.5.7.1 Field Screening

5.1.1.5.7.2 Locations

5.1.1.5.7.3 Sampling Procedure

5.1.1.5.7.4 Analytical Procedure

5.1.1.5.7.5 Sample Containers,
Preservations, Holding
Times

5.1.1.5.8 Matrix: Soil Samples

5.1.1.5.8.1 Field Screening

5.1.1.5.8.2 Locations

5.1.1.5.8.3 Sampling Procedure

5.1.1.5.8.4 Analytical Procedure

5.1.1.5.8.5 Sample Containers,
Preservations, Holding
Times

5.1.1.5.9 Matrix: Sludge I Sediment
Samples

5.1.1.5.9.1 Field Screening

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- 5.1.1.5.9.2 Locations
- 5.1.1.5.9.3 Sampling Procedure
- 5.1.1.5.9.4 Analytical Procedure
- 5.1.1.5.9.5 Sample Containers,
Preservations, Holding
Times

5.1.1.6 Section 6. Sample Chain of Custody,
Packing and Shipping

It is important to collaborate with the project regulatory
specialist on correct manifesting and shipping requirements.

5.1.1.7 Section 7. Laboratory Activities

- 5.1.1.7.1 Cooler Receipt Form
- 5.1.1.7.2 Instrument Calibration and
Frequency
- 5.1.1.7.3 Quality Control Procedures
- 5.1.1.7.4 Preventive Maintenance
- 5.1.1.7.5 Corrective Action
- 5.1.1.7.6 Data Reduction, Assessment /
Validation, and Documentation

5.1.1.8 Section 8. Chemical Data Quality
Management Deliverables

- 5.1.1.8.1 Laboratory Daily Quality
Control Reports
- 5.1.1.8.2 Quality Control Summary Report

5.1.2 Contractor Laboratory Approval

- 5.1.2.1 Commercial Laboratory Evaluation
- 5.1.2.2 Laboratory Quality Management Manual
- 5.1.2.3 Preliminary Questionnaire
- 5.1.2.4 Performance Evaluation Samples
- 5.1.2.5 Lab Inspection
- 5.1.2.6 Approval
- 5.1.2.7 Expiration of Validation

5.2 Miscellaneous Requirements

5.2.1 Investigation Derived Wastes

Treatability studies require much greater volumes than
ordinary investigations. Therefore, the remaining laboratory
sample may be substantial and require additional cost for
disposal by the laboratory, or returning to the site for
disposal via the chosen remedial alternative. It is important
to collaborate with the project regulatory specialist on
correct manifesting and shipping requirements.

6. Geotechnical Requirements

The variety of field investigations for an EE/CA is a subset of those appropriate for a remedial investigation; therefore, refer to text in Section 6, Geotechnical Requirements, of the RI/FS scope-of-work outline for typical requirements and other information on the topics listed below. This section is intended to set forth acceptable procedures for doing the work specified under Task 3, Field Investigations (Section 2.3).

- 6.1 General Specifications
 - 6.1.1 Qualified Geologist/Geotechnical Engineer
 - 6.1.2 Applicable Driller Permits and Licenses
 - 6.1.3 Compliance with State Requirements
 - 6.1.4 Utility Clearances
 - 6.1.5 Disposal of Investigation-Derived Waste (IDW)
 - 6.1.6 Explosive Ordnance Disposal
 - 6.1.7 Decontamination of Equipment/Tools
 - 6.1.8 Water Source and Testing
 - 6.1.9 Site Restoration and Protection
 - 6.1.10 Contractor Responsibility for Wells
 - 6.1.11 Site Surveying
- 6.2 Monitoring Well Installation and Drilling Plan (MWIP)
- 6.3 Subsurface Soil/Rock Sampling
 - 6.3.1 Drilling Method
 - 6.3.2 Test Pit Excavation
 - 6.3.3 Logging Requirements
 - 6.3.4 Geotechnical Sampling and Analyses
 - 6.3.5 Coring/Core Handling
 - 6.3.6 Backfilling
 - 6.3.7 Sampling Techniques
 - 6.3.8 Field Screening
 - 6.3.9 Location/Elevation Survey of Boreholes/Test Pits
- 6.4 Monitoring Well Installation
 - 6.4.1 Drilling Method
 - 6.4.2 Soil/Rock Sampling While Drilling
 - 6.4.3 Field Screening
 - 6.4.4 Casing and Screen
 - 6.4.5 Gravel/Sand Pack
 - 6.4.6 Grouting
 - 6.4.7 Surface Completion

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- 6.4.8 Well Development
- 6.4.9 Monitoring Well Construction Diagrams
- 6.4.10 Survey
- 6.4.11 In-Situ Permeability (Single Well) Testing
- 6.4.12 Water Level Measurements
- 6.4.13 Dedicated Pumps and/or Bailers
- 6.4.14 Well Sampling
- 6.5 Aquifer Tests
 - 6.5.1 Pump Test Plan
 - 6.5.2 Pumping Well Installation
 - 6.5.2.1 Drilling Method
 - 6.5.2.2 Soil Sampling While Drilling
 - 6.5.2.3 Field Screening
 - 6.5.2.4 Casing and Screen
 - 6.5.2.5 Gravel/Sand Pack
 - 6.5.2.6 Grouting
 - 6.5.2.7 Surface Completion
 - 6.5.2.8 Well Development
 - 6.5.2.9 Well Construction Diagram
 - 6.5.2.10 Well Survey
 - 6.5.2.11 Initial Water Level Measurements
 - 6.5.2.12 Pump
 - 6.5.2.13 Initial Well Sampling
 - 6.5.3 Observation Well Construction
 - 6.5.3.1 Location(s) and Depth(s)
 - 6.5.3.2 Drilling Method
 - 6.5.3.3 Soil Sampling While Drilling
 - 6.5.3.4 Field Screening
 - 6.5.3.5 Casing and Screen
 - 6.5.3.6 Gravel/Sand Pack
 - 6.5.3.7 Grouting
 - 6.5.3.8 Surface Completion
 - 6.5.3.9 Well Development
 - 6.5.3.10 Well Construction Diagram
 - 6.5.3.11 Well Survey
 - 6.5.3.12 Initial Water Level Measurements
 - 6.5.3.13 Initial Well Sampling
 - 6.5.4 Step Testing of Pumping Well
 - 6.5.5 Pump Test Duration
 - 6.5.6 Water Level Monitoring
 - 6.5.7 Water Sampling During Test
 - 6.5.8 Water Storage or Discharge/Water Treatment
 - 6.5.9 Recovery Monitoring
 - 6.5.10 Data Reduction and Analyses
 - 6.5.11 Aquifer Test Report
- 6.6 Geophysical Surveys
 - 6.6.1 Surface Geophysics

- 6.6.1.1 Methods to be Considered
- 6.6.1.2 Plan Preparation
- 6.6.1.3 Instrument Calibration
- 6.6.1.4 Survey Grid/Traverse Spacing
- 6.6.1.5 Measurement Protocol
- 6.6.1.6 Grid/Traverse Surveying
- 6.6.1.7 Data Recording
- 6.6.1.8 Data Processing and Analysis
- 6.6.1.9 Report and Drawings
- 6.6.2 Downhole Geophysics
 - 6.6.2.1 Operator Licensing
 - 6.6.2.2 Methods to be Used
 - 6.6.2.3 Plan Preparation
 - 6.6.2.4 Instrument Calibration
 - 6.6.2.5 Data Recording and Log Scale
 - 6.6.2.6 Data Analyses
 - 6.6.2.7 Report and Log Presentation
- 6.7 Vadose Zone Permeability/Infiltration Testing
 - 6.7.1 Method
 - 6.7.2 Data Analysis
- 6.8 Modeling
 - 6.8.1 Ground Water Transport
 - 6.8.1.1 Purpose and Rationale
 - 6.8.1.2 Review of Previous Models
 - 6.8.1.3 Area to be Modeled
 - 6.8.1.4 Type of Model
 - 6.8.1.5 Boundary Conditions
 - 6.8.1.6 Calibration
 - 6.8.1.7 Scenarios to be Considered
 - 6.8.1.8 Modeling Report
 - 6.8.2 Contaminant Transport
 - 6.8.2.1 Rationale
 - 6.8.2.2 Review of Previous Models
 - 6.8.2.3 Area to be Modeled
 - 6.8.2.4 Type of Model
 - 6.8.2.5 Boundary Conditions
 - 6.8.2.6 Assumptions
 - 6.8.2.7 Calibration
 - 6.8.2.8 Scenarios to be Considered
 - 6.8.2.9 Modeling Report
 - 6.8.3 Vadose Zone Air Flow
 - 6.8.3.1 Rationale
 - 6.8.3.2 Review of Previous Models
 - 6.8.3.3 Location
 - 6.8.3.4 Type of Model
 - 6.8.3.5 Boundary Conditions and Assumptions
 - 6.8.3.6 Calibration

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- 6.8.3.7 Scenarios to be Considered
- 6.8.3.8 Modeling Report
- 6.8.4 Geochemical Modeling
 - 6.8.4.1 Rationale
 - 6.8.4.1 Type of Model
 - 6.8.4.1 Scenarios to be Considered
 - 6.8.4.1 Modeling Report
- 6.8.5 Surface Water Modeling
- 6.9 Miscellaneous Methodologies
 - 6.9.1 Soil Gas survey Methodology
 - 6.9.1.1 Probe Design and Placement
 - 6.9.1.2 Probe Purging
 - 6.9.1.3 Sample Recovery
 - 6.9.1.4 Decontamination of Equipment
 - 6.9.1.5 Blank, Background, and Duplicate Samples

7. Air

This section presents the technical requirements for performance of activities associated with air impact assessments. Enclosure 16 presents a general description of air impact assessments for those not familiar with the process.

Refer to the RI/FS outline for explanatory text. Activities performed in the EE/CA are similar to that of the RI/FS but may be limited in scope. The level of detail to be included in the SOW depends on the project and the Contractor's experience in performing air monitoring and modeling as well as the Contractor's experience in working with the Corps.

- 7.1 Ambient Air Monitoring/Sampling
- 7.2 Meteorological Monitoring
 - 7.2.1 Review Available Data
 - 7.2.2 On-site Monitoring
 - 7.2.2.1 Meteorological Tower
 - 7.2.2.2 Data to be Collected
 - 7.2.2.3 Data Processing, Documentation and Reporting
- 7.3 Emission Rate Measurements
- 7.4 Emission Rate Estimates
 - 7.4.1 Uncontrolled Emission Sources
 - 7.4.2 Remedial Action Sources
 - 7.4.3 Emission Models
 - 7.4.4 Emission Factors

- 7.5 Atmospheric Dispersion Modeling
 - 7.5.1 Purpose and Rationale
 - 7.5.2 Review of Previous Models
 - 7.5.3 Input Data
 - 7.5.3.1 Source Data
 - 7.5.3.2 Receptor Data
 - 7.5.3.3 Meteorological Data
 - 7.5.4 Modeling Methodology
 - 7.5.5 Reporting Results
- 8. Miscellaneous Requirements